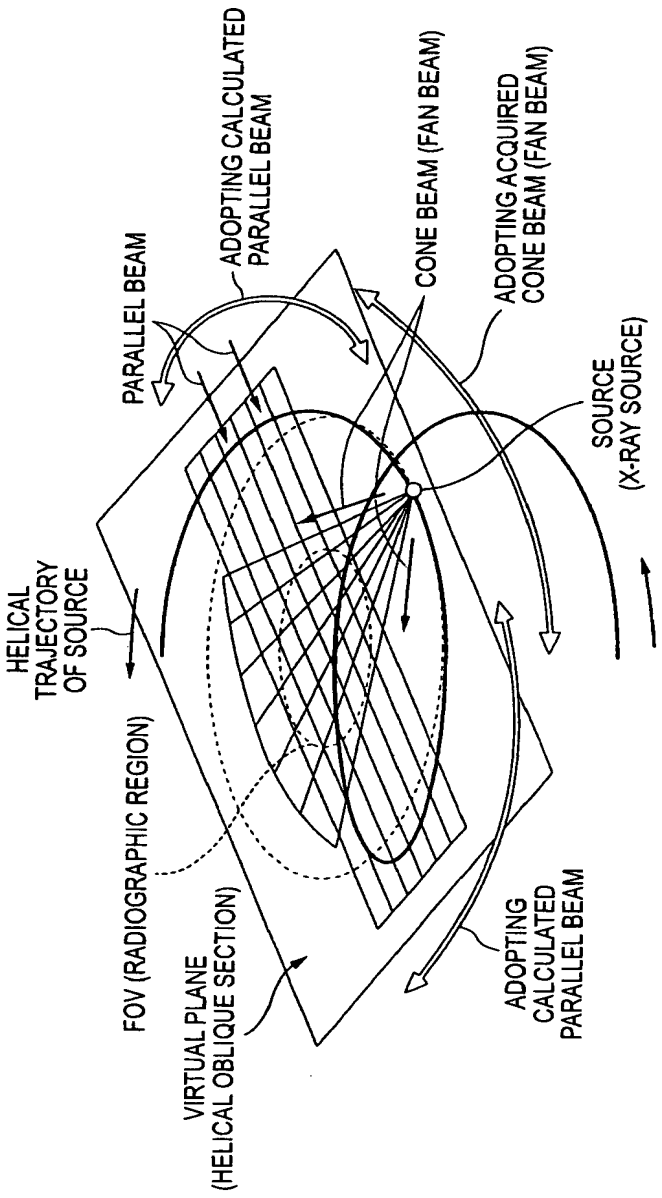
FIG. 1


PARALLEL BEAM
ADOPTING CALCULATED PARALLEL BEAM
CONE BEAM (FAN BEAM)
ADOPTING ACQUIRED CONE BEAM (FAN BEAM)
SOURCE (X-RAY SOURCE)
HELICAL TRAJECTORY OF SOURCE
FOV (RADIOGRAPHIC REGION)
VIRTUAL PLANE (HELICAL OBLIQUE SECTION)
ADOPTING CALCULATED PARALLEL BEAM

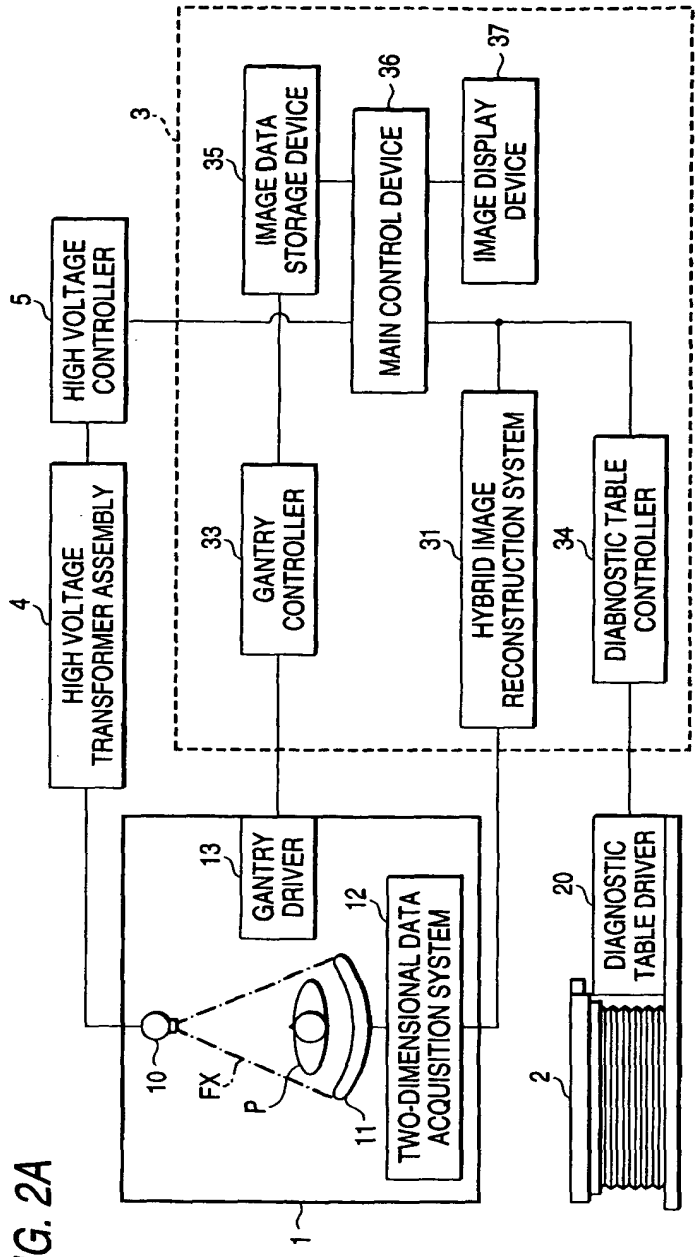

HIGH VOLTAGE TRANSFORMER ASSEMBLY
HIGH VOLTAGE CONTROLLER
IMAGE DATA STORAGE DEVICE
MAIN CONTROL DEVICE
IMAGE DISPLAY DEVICE
GANTRY CONTROLLER
HYBRID IMAGE RECONSTRUCTION SYSTEM
DIABNOSTIC TABLE CONTROLLER
GANTRY DRIVER
TWO-DIMENSIONAL DATA ACQUISITION SYSTEM
DIAGNOSTIC TABLE DRIVER
FX
P
1
2
3
4
5
10
11
12
13
20
31
33
34
35
36
37

FIG. 2A

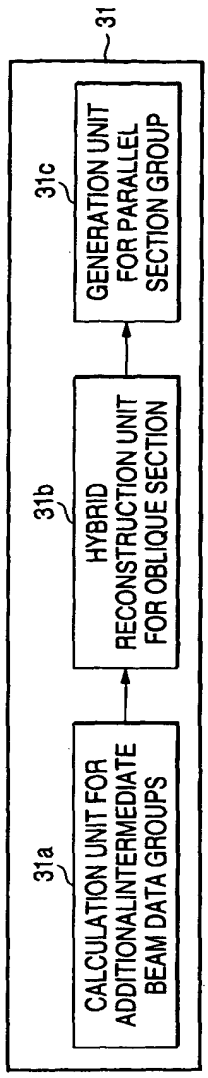

CALCULATION UNIT FOR ADDITIONALINTERMEDIATE BEAM DATA GROUPS
HYBRID RECONSTRUCTION UNIT FOR OBLIQUE SECTION
GENERATION UNIT FOR PARALLEL SECTION GROUP
31
31a
31b
31c

FIG. 2B

FIG. 3

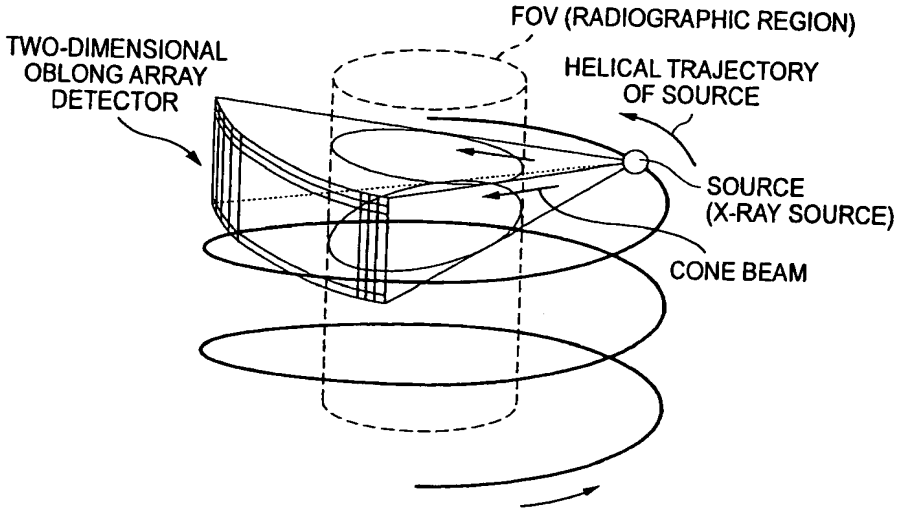


FIG. 4
PRIOR ART

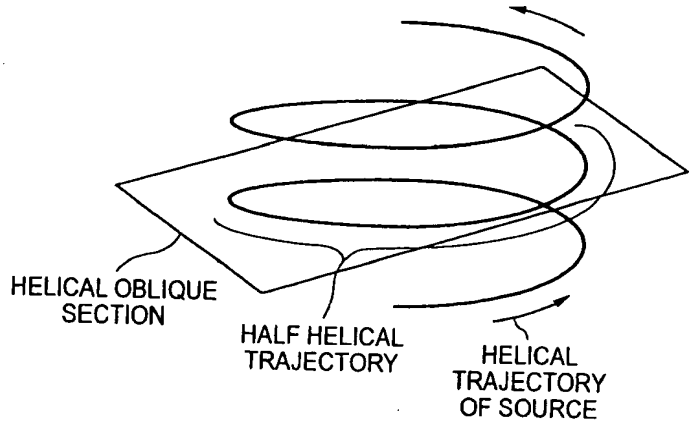


FIG. 5

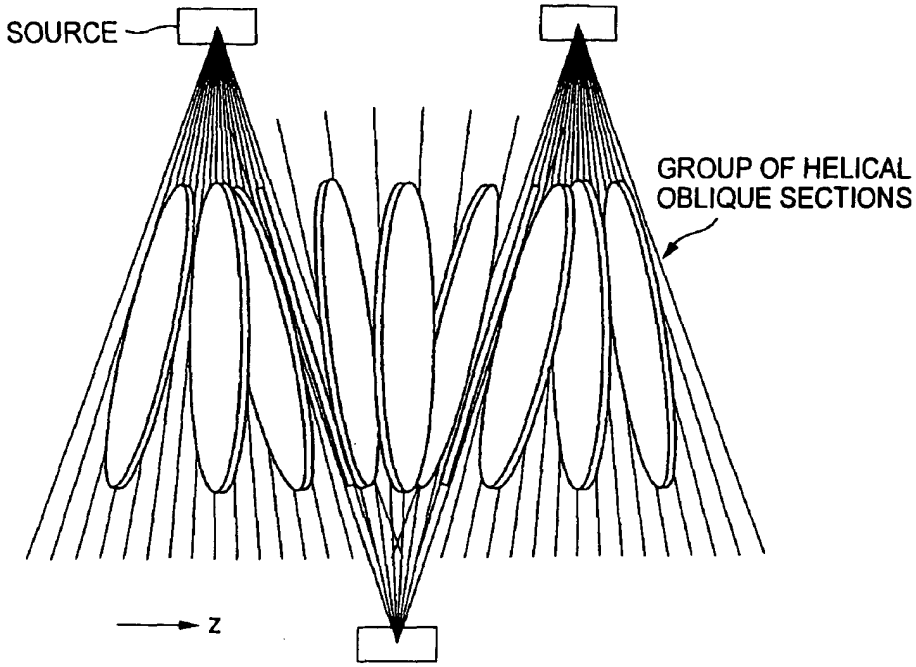

SOURCE
GROUP OF HELICAL OBLIQUE SECTIONS
z

FIG. 6

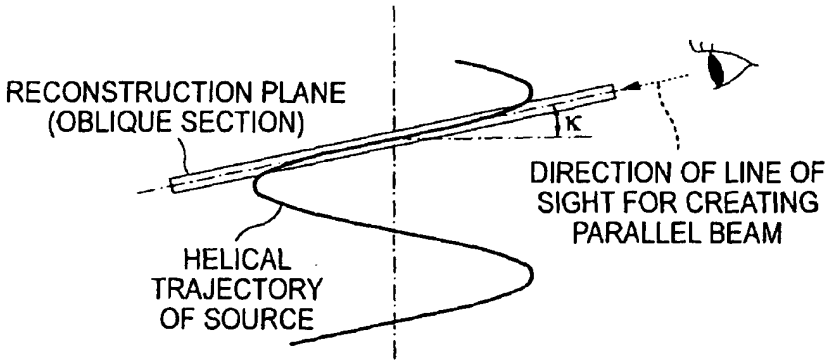

RECONSTRUCTION PLANE (OBLIQUE SECTION)
κ
DIRECTION OF LINE OF SIGHT FOR CREATING PARALLEL BEAM
HELICAL TRAJECTORY OF SOURCE

FIG. 7A

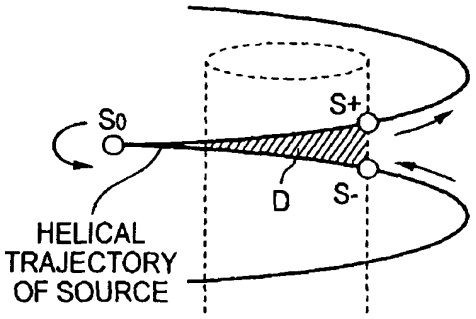


FIG. 7B

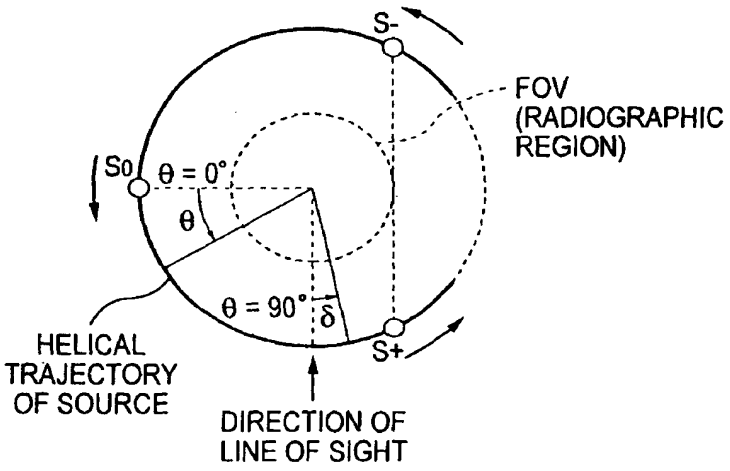


FIG. 7C

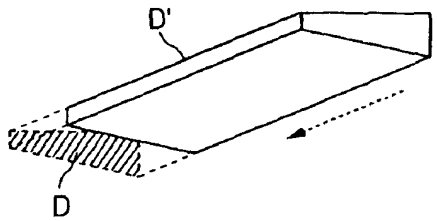


FIG. 8A

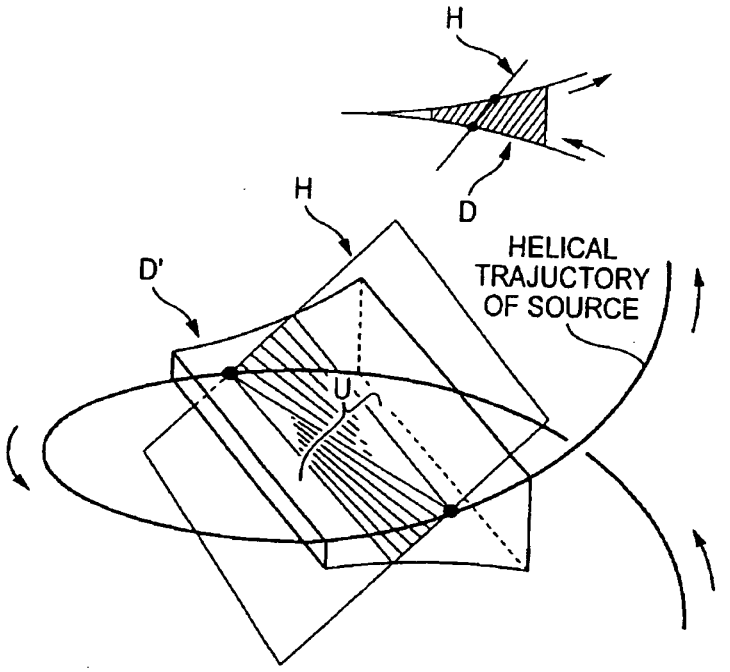


FIG. 8B

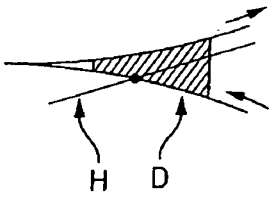


FIG. 8C

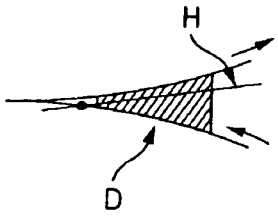


FIG. 8D

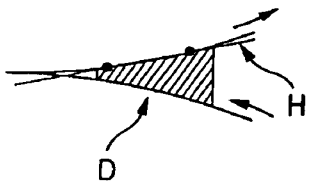


FIG. 9

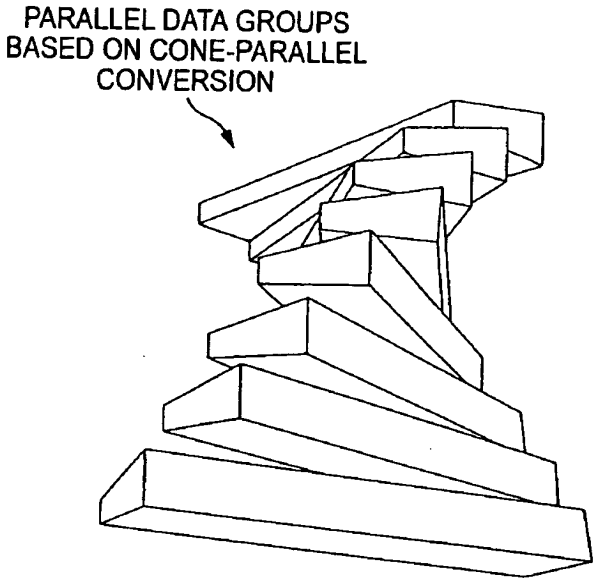


FIG. 10A

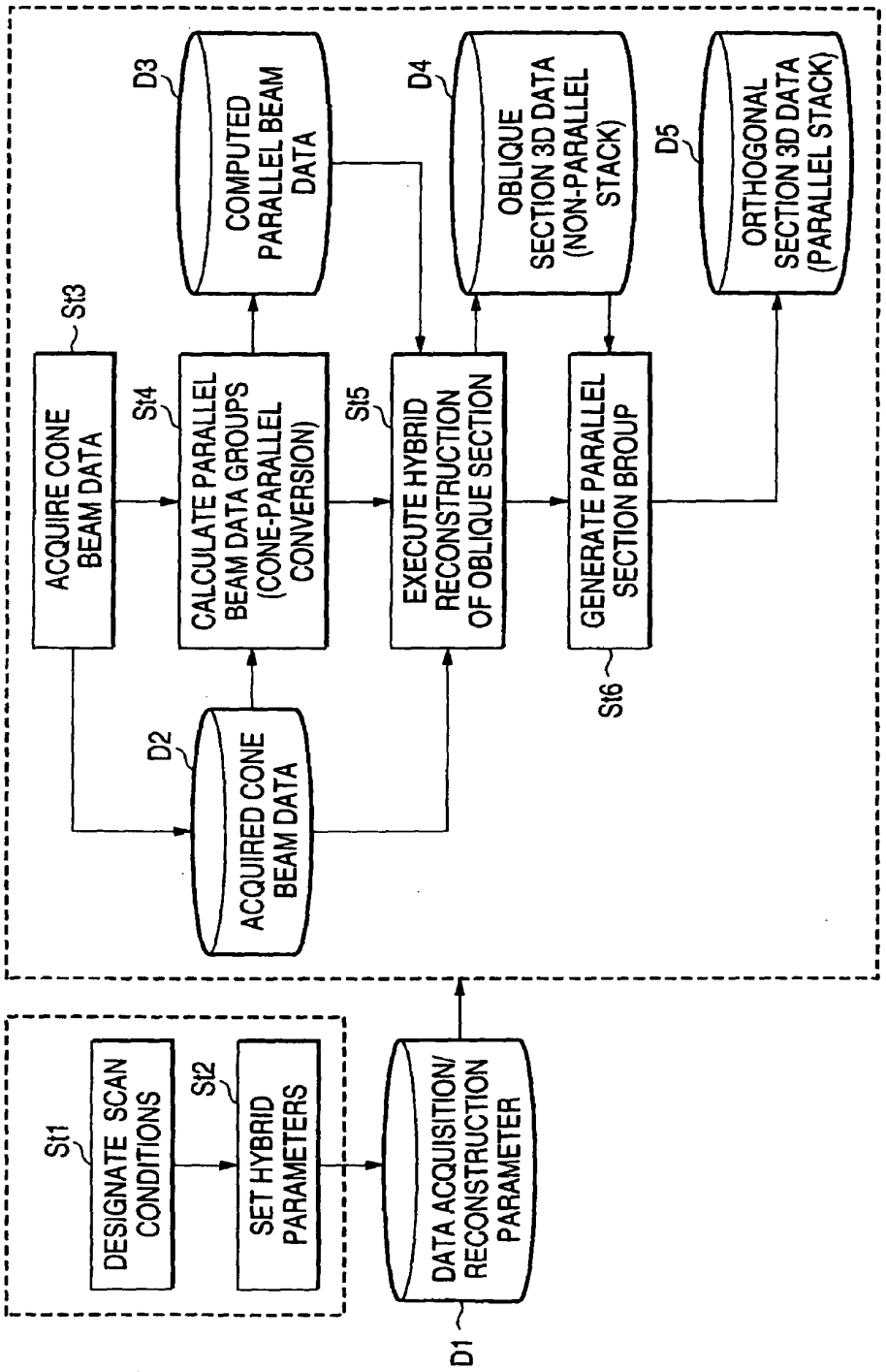

DESIGNATE SCAN CONDITIONS
St1
SET HYBRID PARAMETERS
St2
DATA ACQUISITION/ RECONSTRUCTION PARAMETER
D1
ACQUIRE CONE BEAM DATA
St3
CALCULATE PARALLEL BEAM DATA GROUPS (CONE-PARALLEL CONVERSION)
St4
EXECUTE HYBRID RECONSTRUCTION OF OBLIQUE SECTION
St5
GENERATE PARALLEL SECTION BROUP
St6
ACQUIRED CONE BEAM DATA
D2
COMPUTED PARALLEL BEAM DATA
D3
OBLIQUE SECTION 3D DATA (NON-PARALLEL STACK)
D4
ORTHOGONAL SECTION 3D DATA (PARALLEL STACK)
D5

FIG. 10B

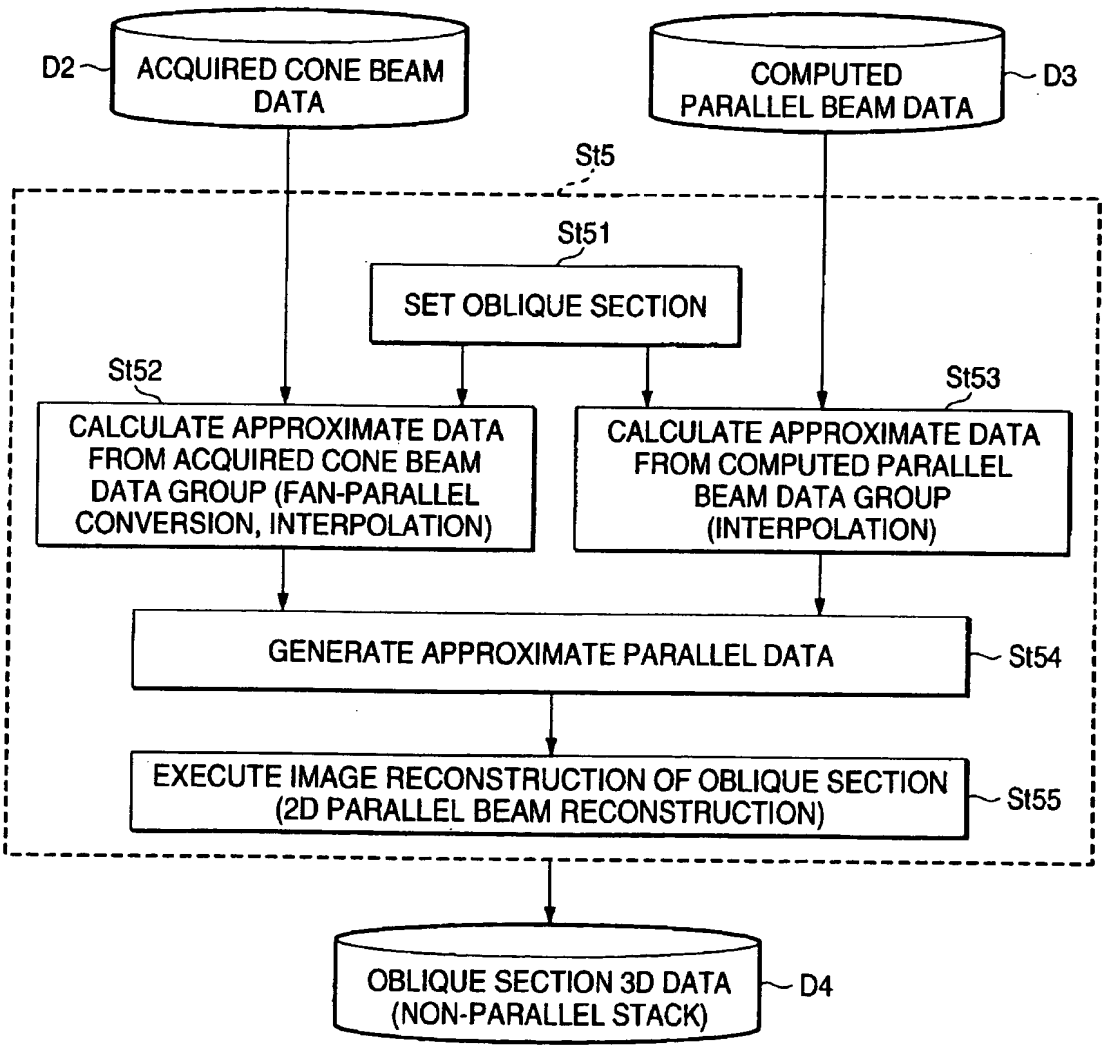

D2
ACQUIRED CONE BEAM DATA
COMPUTED PARALLEL BEAM DATA
D3
St5
St51
SET OBLIQUE SECTION
St52
CALCULATE APPROXIMATE DATA FROM ACQUIRED CONE BEAM DATA GROUP (FAN-PARALLEL CONVERSION, INTERPOLATION)
St53
CALCULATE APPROXIMATE DATA FROM COMPUTED PARALLEL BEAM DATA GROUP (INTERPOLATION)
GENERATE APPROXIMATE PARALLEL DATA
St54
EXECUTE IMAGE RECONSTRUCTION OF OBLIQUE SECTION (2D PARALLEL BEAM RECONSTRUCTION)
St55
OBLIQUE SECTION 3D DATA (NON-PARALLEL STACK)
D4

FIG. 11

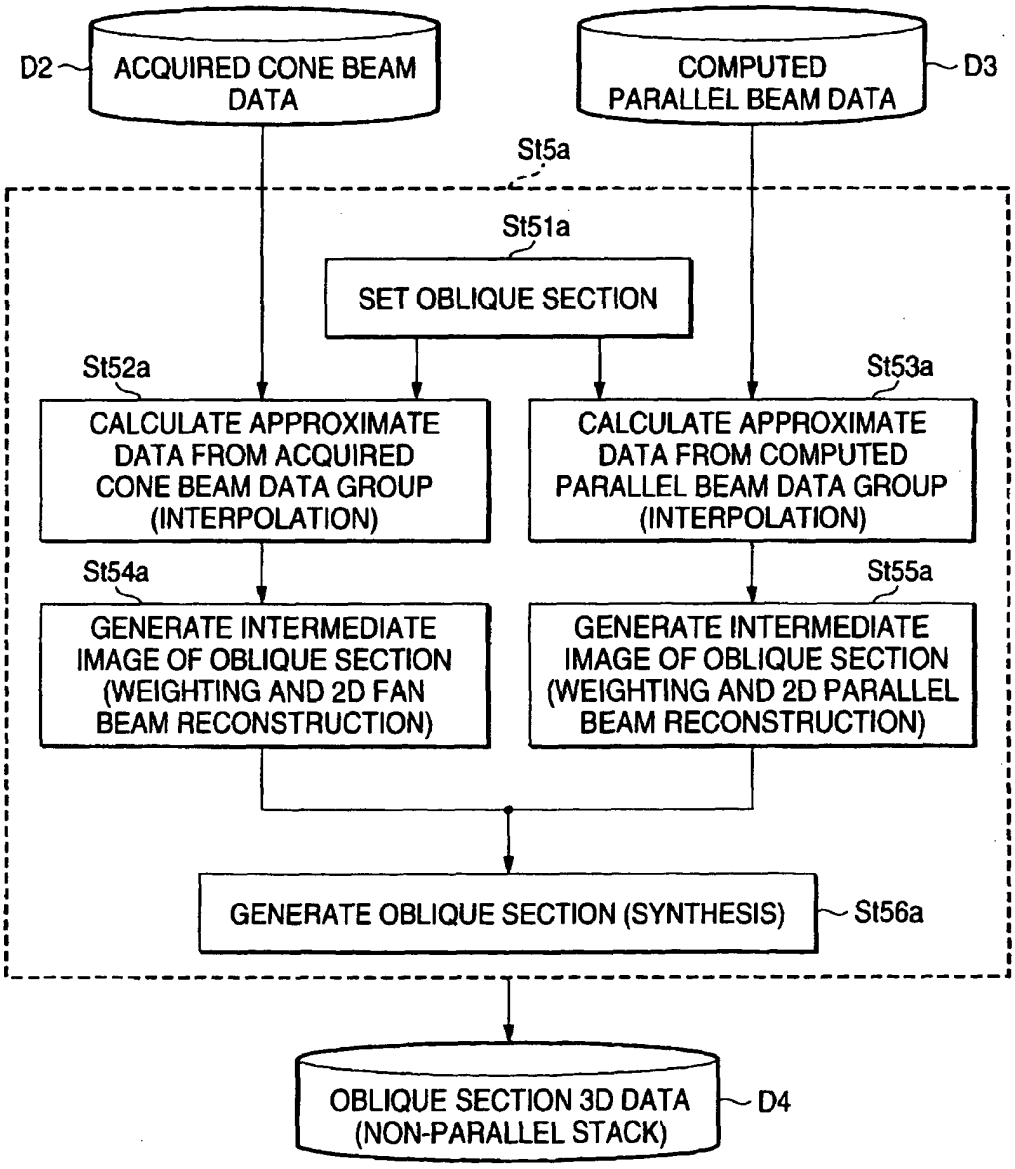

D2
ACQUIRED CONE BEAM DATA
COMPUTED PARALLEL BEAM DATA
D3
St5a
St51a
SET OBLIQUE SECTION
St52a
St53a
CALCULATE APPROXIMATE DATA FROM ACQUIRED CONE BEAM DATA GROUP (INTERPOLATION)
CALCULATE APPROXIMATE DATA FROM COMPUTED PARALLEL BEAM DATA GROUP (INTERPOLATION)
St54a
St55a
GENERATE INTERMEDIATE IMAGE OF OBLIQUE SECTION (WEIGHTING AND 2D FAN BEAM RECONSTRUCTION)
GENERATE INTERMEDIATE IMAGE OF OBLIQUE SECTION (WEIGHTING AND 2D PARALLEL BEAM RECONSTRUCTION)
GENERATE OBLIQUE SECTION (SYNTHESIS)
St56a
OBLIQUE SECTION 3D DATA (NON-PARALLEL STACK)
D4

FIG. 12A

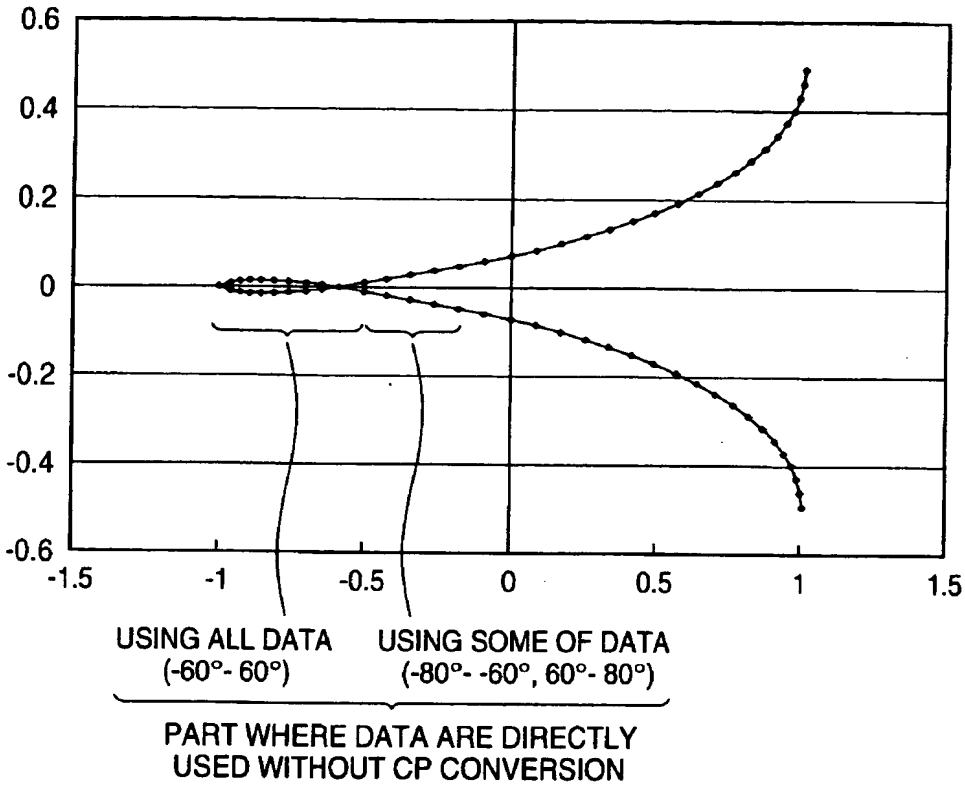


FIG. 12B

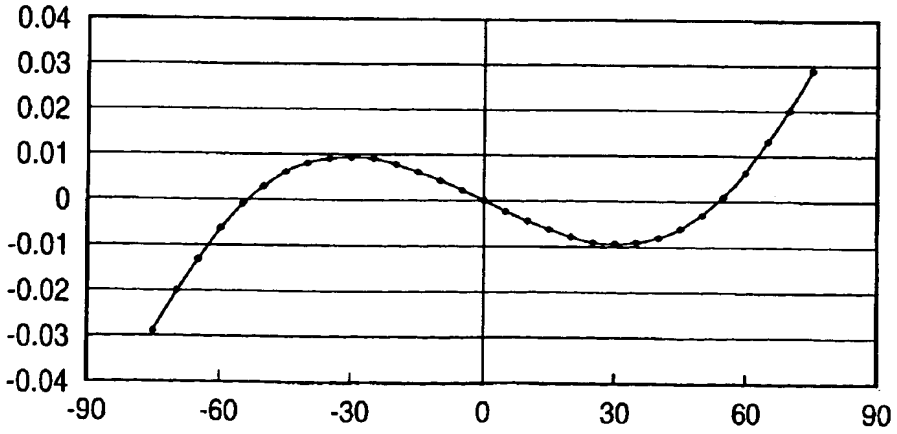


FIG. 13
PRIOR ART

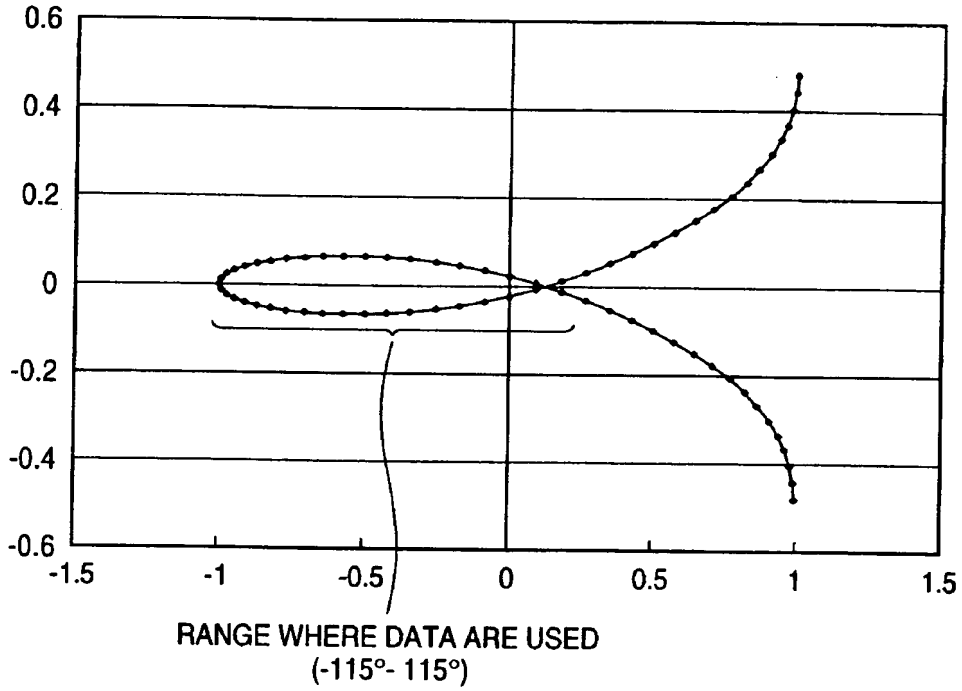


FIG. 14A

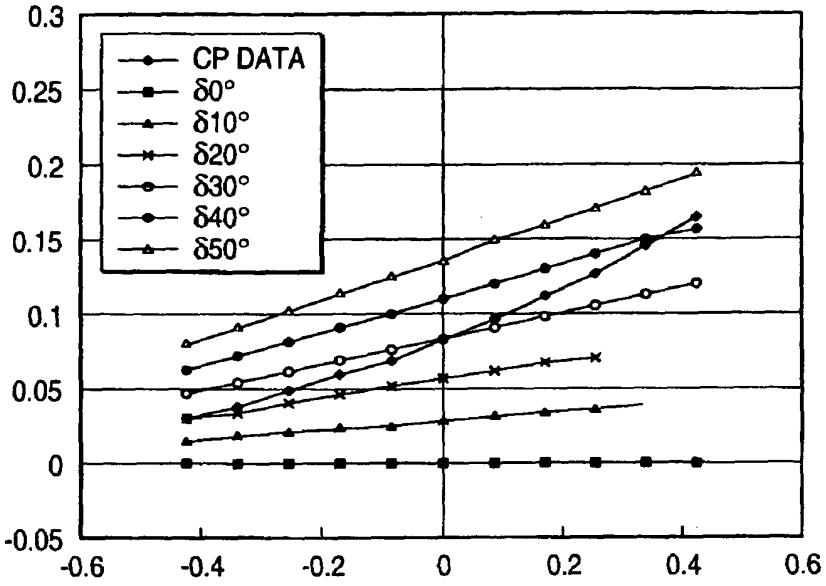


FIG. 14B

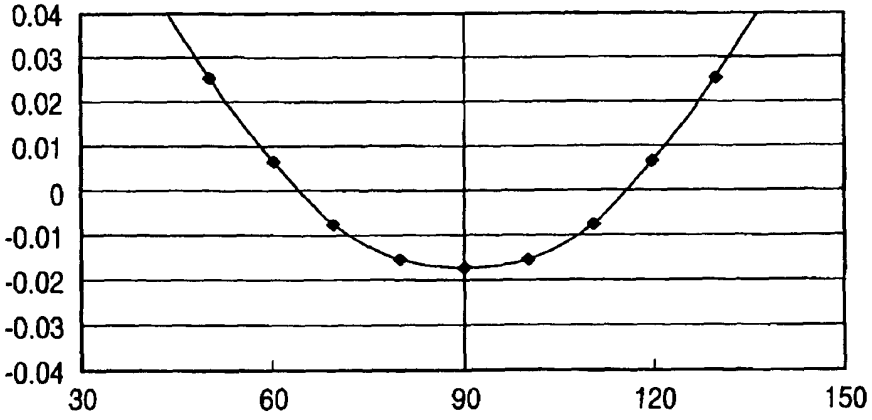


FIG. 15

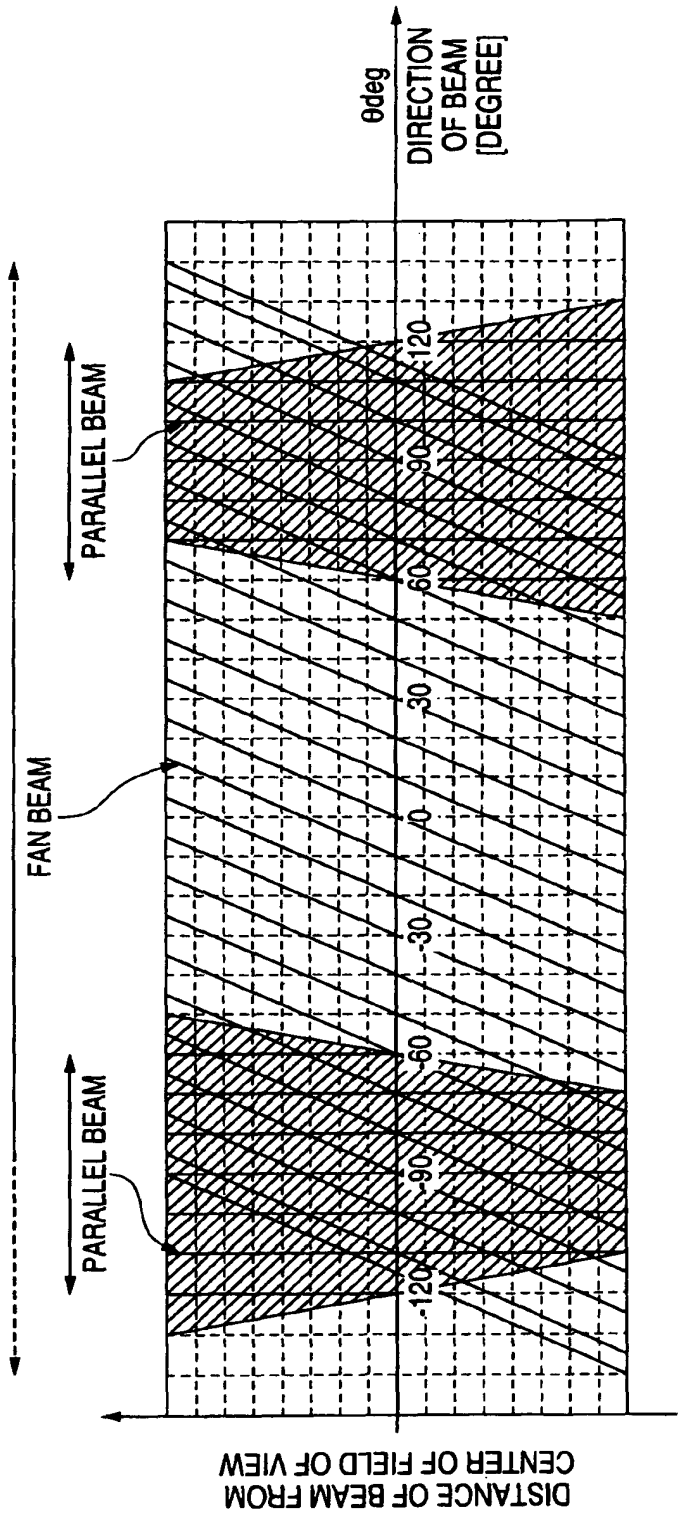

θdeg
DIRECTION OF BEAM [DEGREE]
120
90
60
30
0
-30
-60
-90
-120
PARALLEL BEAM
FAN BEAM
PARALLEL BEAM
DISTANCE OF BEAM FROM CENTER OF FIELD OF VIEW

FIG. 16

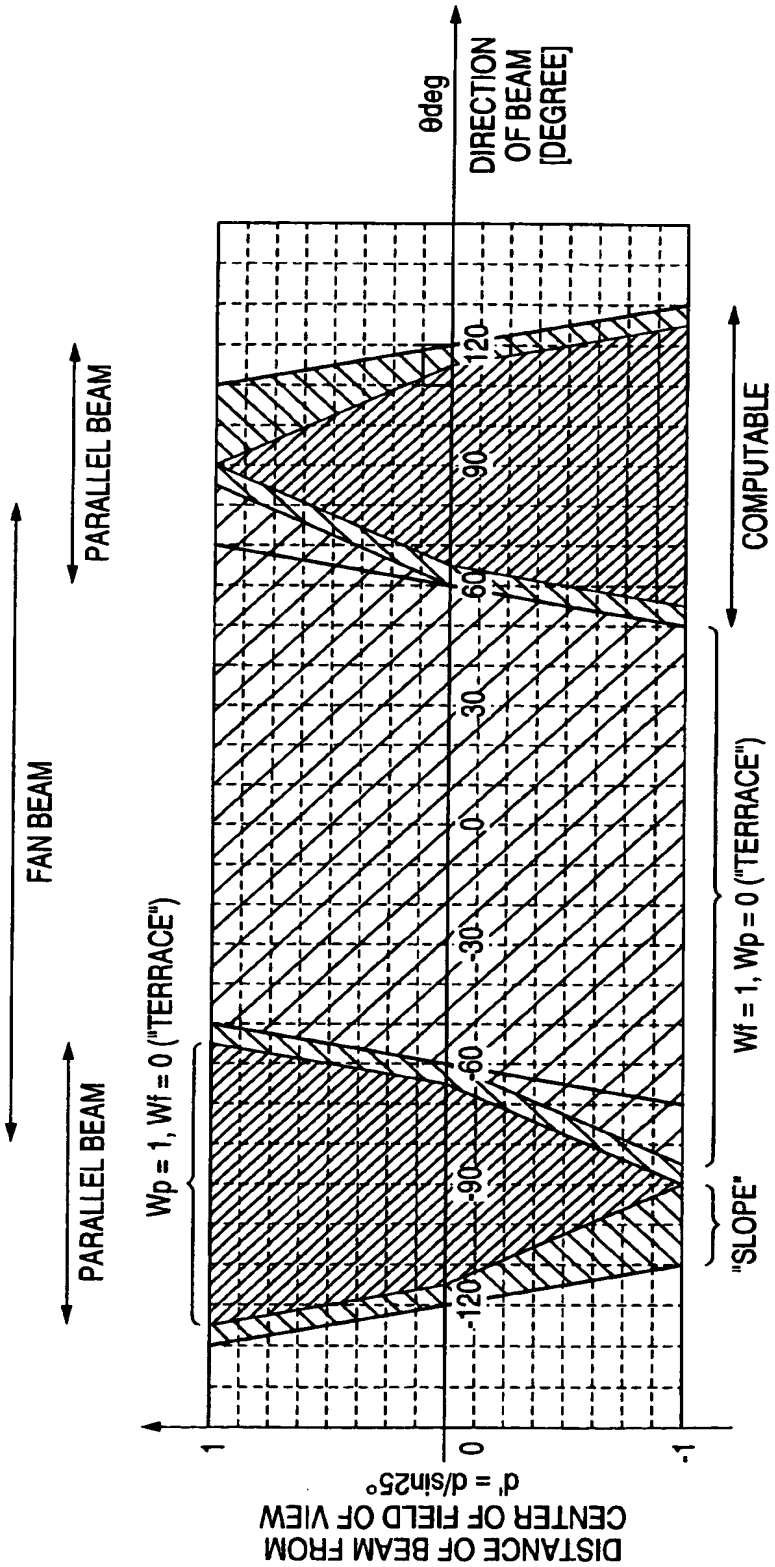

θdeg
DIRECTION OF BEAM [DEGREE]
120
90
60
30
0
-30
-60
-90
-120
COMPUTABLE
Wf = 1, Wp = 0 ("TERRACE")
"SLOPE"
PARALLEL BEAM
FAN BEAM
PARALLEL BEAM
Wp = 1, Wf = 0 ("TERRACE")
1
0
-1
d' = d/sin25°
DISTANCE OF BEAM FROM CENTER OF FIELD OF VIEW

FIG. 17A

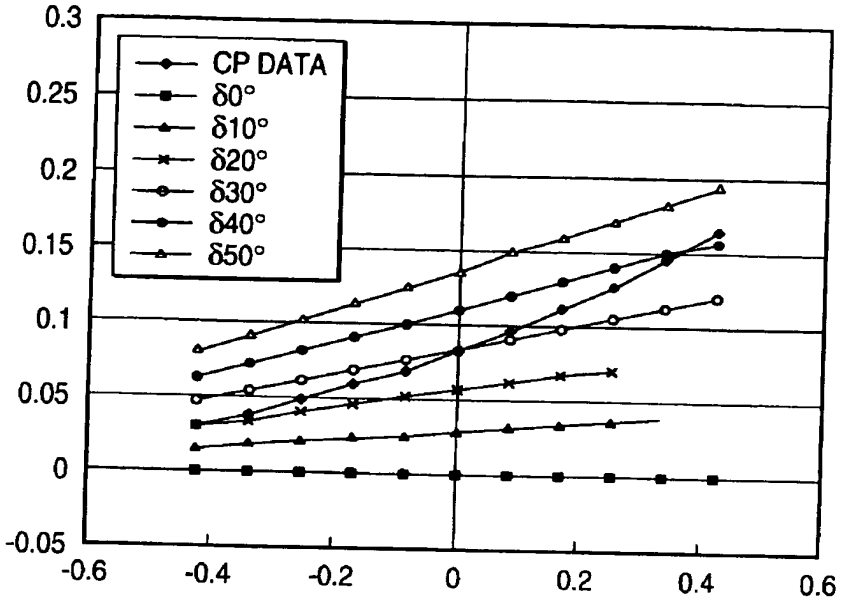


FIG. 17B

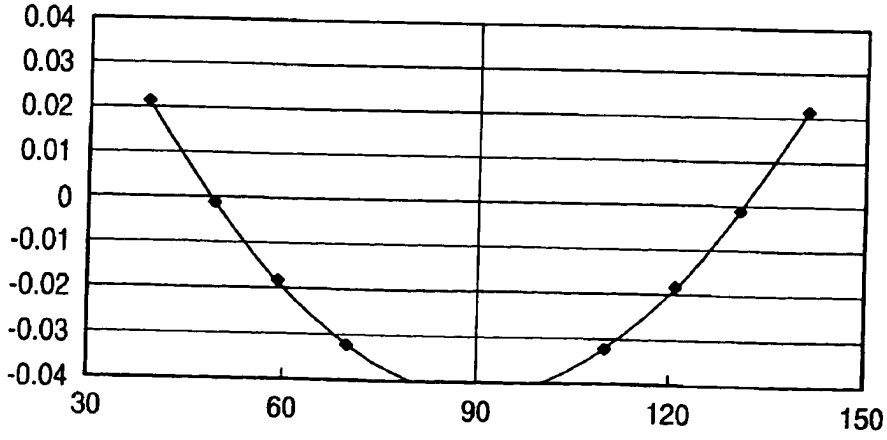
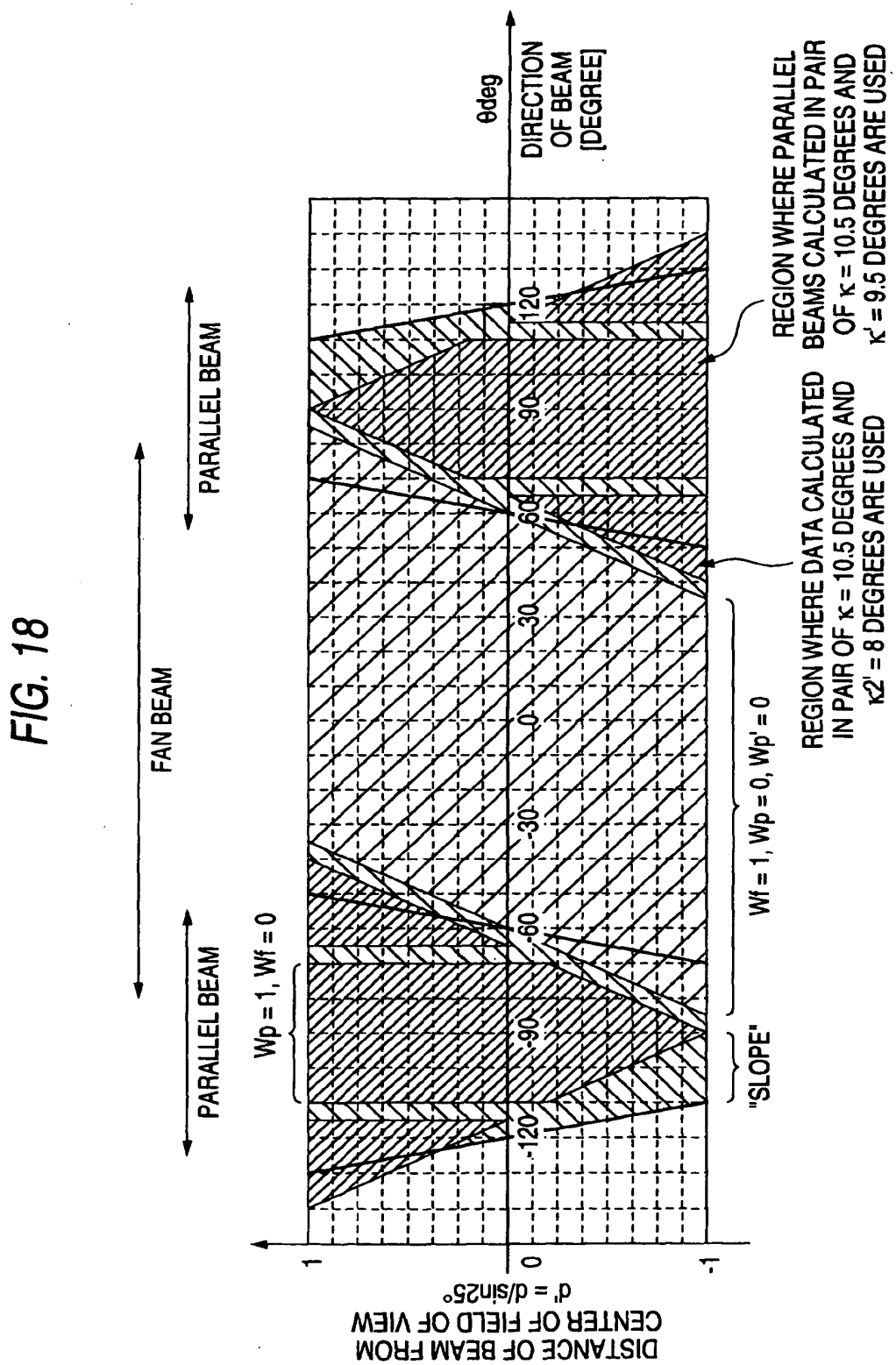


FIG. 18


θdeg
DIRECTION OF BEAM [DEGREE]
120
90
60
30
0
-30
-60
-90
-120
REGION WHERE PARALLEL BEAMS CALCULATED IN PAIR OF κ = 10.5 DEGREES AND κ' = 9.5 DEGREES ARE USED
REGION WHERE DATA CALCULATED IN PAIR OF κ = 10.5 DEGREES AND κ2' = 8 DEGREES ARE USED
Wf = 1, Wp = 0, Wp' = 0
"SLOPE"
Wp = 1, Wf = 0
PARALLEL BEAM
FAN BEAM
PARALLEL BEAM
1
0
-1
d' = d/sin25°
DISTANCE OF BEAM FROM CENTER OF FIELD OF VIEW

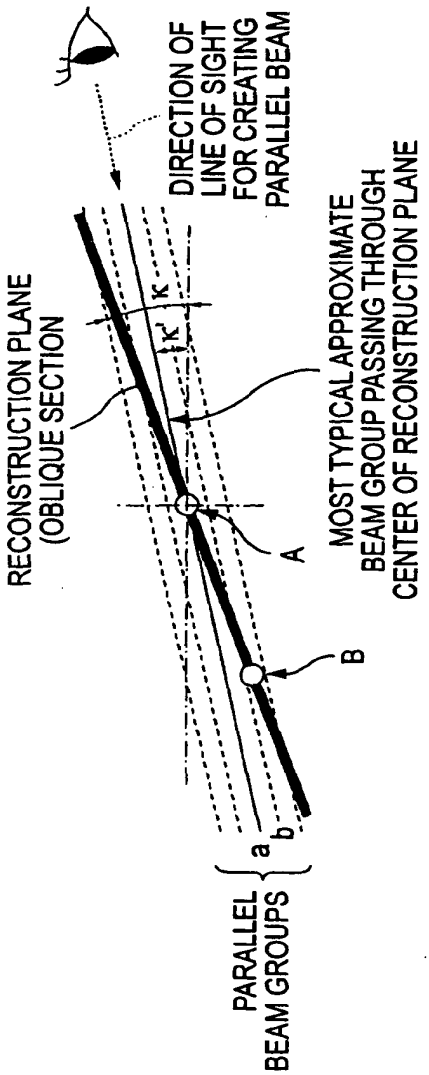


FIG. 19A

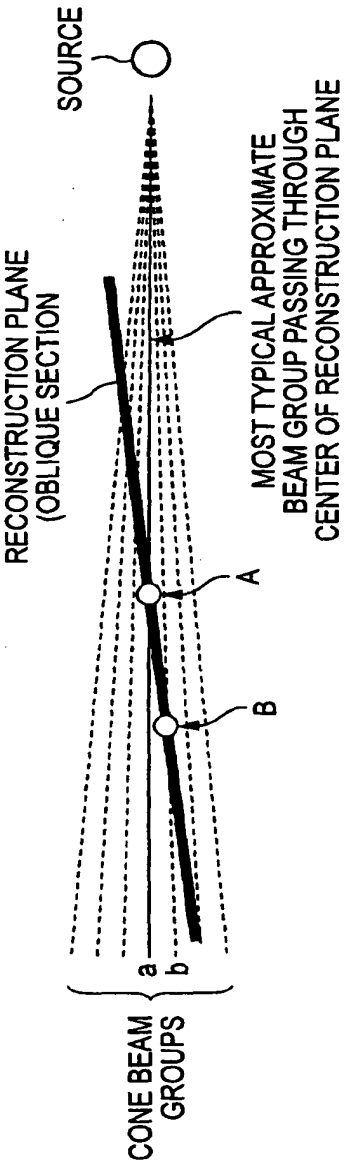


FIG. 19B

FIG. 20A

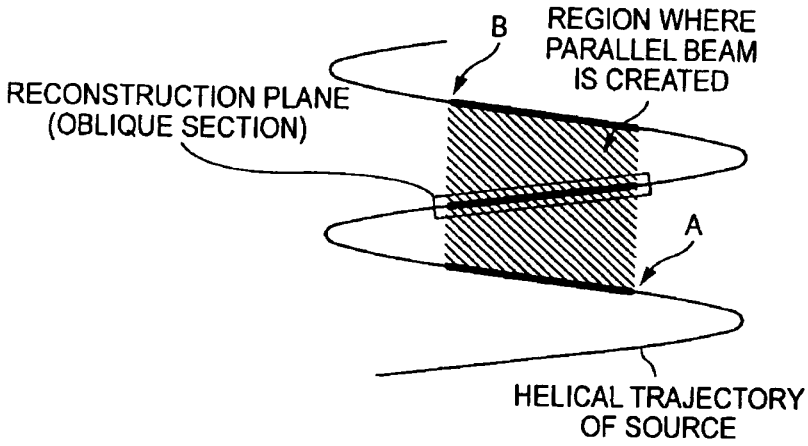
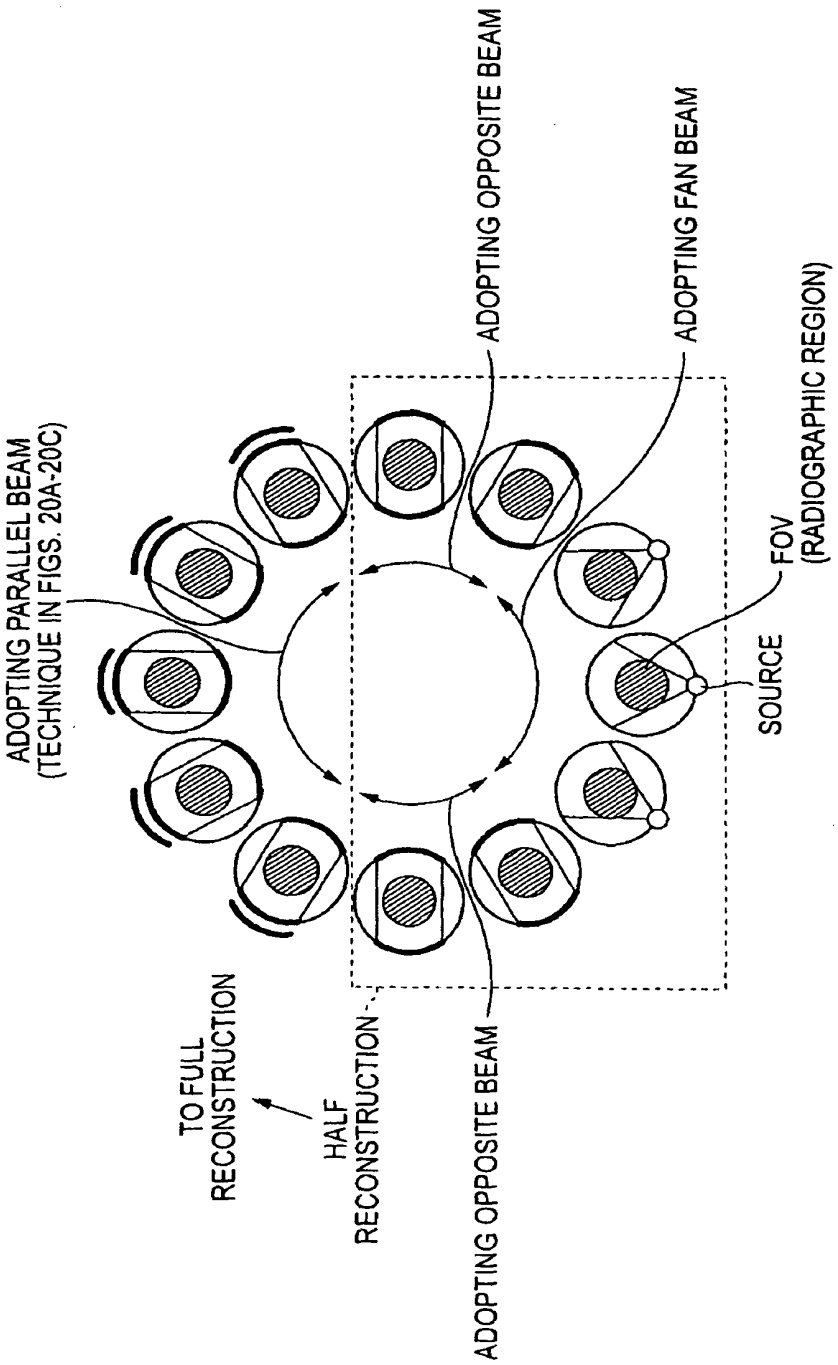


FIG. 20B

FIG. 20C

FIG. 21


ADOPTING PARALLEL BEAM
(TECHNIQUE IN FIGS. 20A-20C)
ADOPTING OPPOSITE BEAM
ADOPTING FAN BEAM
FOV
(RADIOGRAPHIC REGION)
SOURCE
TO FULL
RECONSTRUCTION
HALF
RECONSTRUCTION
ADOPTING OPPOSITE BEAM